

Appl. No. 09/887,371
Amdt. dated Dec. 22, 2003
Reply to Office Action of June 20, 2003

In the Claims:

Please amend claims 43-86 and add new claims 87-91.

Listing of Claims:

43. (Currently amended) A method for ~~concurrently~~ isolating at least a portion of both a selected compound and a ~~biological contaminants~~contaminant from a fluid stream, the method comprising:

- (a) directing a first fluid stream having a selected pH and including at least one biological contaminant and a selected compound so as to flow along a first selective membrane;
- (b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;
- (c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane, whereby the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream;
- (d) ~~applying at least one voltage electric potential across at least the first and second one of the fluid streams, wherein the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream;~~ whereby at least a portion of at least one of the selected compound and the biological contaminant moves through a selective membrane into a fluid stream, substantially all transmembrane migration of the selected compound is initiated by application of the electric potential and
- (e) maintaining step (d) until at least one of the fluid streams contains a desired purity of the selected compound and another stream contains the biological contaminant.

44. (Currently amended) The method according to claim 43 ~~wherein~~whereby the first selective membrane has a preselected pore size so as to allow selective migration of components in the first fluid stream through the first selective membrane into the second fluid stream and selectively retain other components in ~~the~~an ~~first~~other fluid stream.

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45. (Currently amended) The method according to claim 43 ~~wherein~~whereby the step of directing the third fluid stream comprises directing the third fluid stream so as to be separated from the second fluid stream by the second selective membrane.

46. (Currently amended) The method according to claim 45 ~~wherein~~whereby the second selective membrane has a preselected pore size ~~so as to, thereby at least~~ substantially ~~prevent~~preventing at least one of the selected compound and ~~selected biological contaminants~~contaminant removed to the second fluid stream from migrating through the second selective membrane into the third fluid stream ~~and while~~ substantially ~~retain the~~retaining at least one of the selected compound and ~~selected biological contaminants~~contaminant in the second fluid stream.

47. (Currently amended) The method according to claim 46 ~~wherein the application of a voltage potential across the third fluid stream causes movement of~~whereby at least a portion of at least one of the selected compound and ~~selected biological contaminants~~contaminant ~~removed~~moves to the second fluid stream through the second selective membrane into the third fluid stream.

48. (Currently amended) The method according to claim 46 ~~wherein the method further comprises~~comprising directing a fourth fluid stream separated from one of the first fluid stream~~streams~~ by a third selective membrane, ~~wherein~~whereby ~~the~~ preselected pore size of the third selective membrane allows selective migration of components in one of the first fluid stream~~streams~~ through the third selective membrane into the fourth fluid stream.

49. (Currently amended) The method according to claim 48 ~~wherein~~whereby the third selective membrane has a preselected pore size ~~so as to, substantially prevent~~preventing at least one of ~~the any~~ selected compound remaining in the first fluid stream, any biological ~~contaminants~~contaminant remaining in the first fluid stream, and any other compounds remaining in the first fluid stream from migrating through the third selective membrane into the fourth fluid stream ~~and while~~ substantially ~~retain the~~retaining at least one of the selected compound, biological contaminants, and other components in the second fluid stream.

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50. (Currently amended) The method according to claim 48 ~~wherein the application of a voltage potential across the fourth fluid stream causes migration of~~ whereby at least a portion of at least one of any selected compound remaining in the first fluid stream, any biological ~~contaminants~~ contaminant remaining in the first fluid stream, and any other compounds remaining in the first fluid stream moves through the third selective membrane into the fourth fluid stream.

51. (Currently amended) The method according to claim 43 ~~wherein~~ whereby the step of directing a third fluid stream directing the third fluid stream so as to be separated from the first fluid stream by the second selective membrane.

52. (Currently amended) The method according to claim ~~51~~ 43 ~~wherein~~ whereby the second selective membrane has a preselected pore size so as to substantially prevent at least one of ~~the~~ any selected compound remaining in the first fluid stream, any biological ~~contaminants~~ contaminant remaining in the first fluid stream, and any other compounds remaining in the first fluid stream from migrating through the second selective membrane into the third fluid stream and substantially retain at least one of the selected compound, biological ~~contaminants~~ contaminant, and other components in the first fluid stream.

53. (Currently amended) The method according to claim ~~51~~ 43 ~~wherein the application of a voltage potential across the third fluid stream causes migration of at least a portion of~~ whereby at least one of any selected compound remaining in the first fluid stream, any biological contaminants remaining in the first fluid stream, and any other compounds remaining in the first fluid stream moves through the second selective membrane into the third fluid stream.

54. (Currently amended) The method according to claim ~~51~~ 43 ~~wherein the method~~ further comprises comprising directing a fourth fluid stream separated from the second fluid stream by a third selective membrane, ~~wherein~~ whereby ~~the~~ a preselected pore size of the third selective membrane allows selective migration of components in the second fluid stream through the third selective membrane into the fourth fluid stream.

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55. (Currently amended) The method according to claim 54 ~~wherein~~ whereby the third selective membrane has a preselected pore size so as to substantially prevent at least one of the selected compound and selected biological contaminants removed to the second fluid stream from migrating through the third selective membrane into the fourth fluid stream ~~and~~ while substantially ~~retain the~~ retaining at least one of the selected compound and selected biological ~~contaminants~~ contaminant in the second fluid stream.

56. (Currently amended) The method according to claim 54 ~~wherein the application of a voltage potential across the fourth fluid stream causes movement of~~ whereby at least a portion of at least one of the selected compound and selected biological ~~contaminants~~ contaminant ~~removed~~ moves to the second fluid stream through the third selective membrane into the fourth fluid stream.

57. (Currently amended) The method according to claim 43 ~~wherein~~ whereby the method further comprises periodically stopping and reversing the ~~voltage~~ electric potential ~~to cause movement of at least~~ whereby any compounds of the first fluid stream having entered the first selective membrane ~~to move back into the first fluid stream and~~ while substantially ~~not causing~~ preventing any of the selected compound and biological ~~contaminants~~ contaminant that have entered the second fluid stream to re-enter the first fluid stream.

58. (Currently amended) The method according to claim 43 ~~wherein~~ whereby the first fluid stream further includes a compound from which the selected compound is separated, ~~wherein~~ whereby such compound is selected from the group consisting of blood proteins, immunoglobulins, recombinant proteins, and combinations thereof.

59. (Currently amended) The method according to claim 43 ~~wherein~~ whereby the biological contaminant is selected from the group consisting of viruses, bacteria, prions, yeast, lipopolysaccharides, toxins, endotoxins, and combinations thereof.

60. (Currently amended) The method according to claim 43 ~~wherein~~ whereby the pH of the first fluid stream is selected by ~~selectively~~ adding a buffer having the required pH and the pH is selected ~~at one from the group consisting of~~ a pH lower than the isoelectric point of the selected

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compound, a pH about the isoelectric point of the selected compound, and a pH higher than the isoelectric point of the selected compound.

61. (Currently amended) A method for ~~concurrently~~-isolating at least a portion of both a selected compound and biological ~~contaminants~~contaminant from a fluid stream, the method comprising:

- (a) directing a first fluid stream having a selected pH and including at least one biological contaminant and a selected compound so as to flow along a first selective membrane;
- (b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;
- (c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane;
- (d) applying at least one ~~voltage~~electric potential across at least the first and second fluid streams, ~~wherein~~whereby the application of such at least one ~~voltage~~electric potential causes movement of at least a portion of the biological contaminants through the first selective membrane into the second fluid stream while the selected compound is prevented from entering the second fluid stream, ~~wherein~~whereby the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream, and substantially all transmembrane migration of the selected compound is initiated by application of the electric potential; and
- (e) maintaining step (d) until at least one of the fluid streams contains a desired purity of the selected compound.

62. (Currently amended) The method according to claim 61 ~~wherein~~whereby the first selective membrane has a preselected pore size so as to allow selective migration of components in the first fluid stream through the first selective membrane into the second fluid stream and selectively retain other components in the first fluid stream.

63. (Currently amended) The method according to claim 61 ~~wherein~~whereby the step of directing the third fluid stream comprises directing the third fluid stream so as to be separated from the first fluid stream by the second selective membrane.

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64. (Currently amended) The method according to claim 63 ~~wherein~~whereby the second selective membrane has a preselected pore size so as to substantially prevent at least one of the selected compound and ~~selected-biological contaminants~~contaminant remaining in the first fluid stream from migrating through the second selective membrane into the third fluid stream and substantially retain at least one of the selected compound and ~~selected-biological contaminants~~contaminant in the first fluid stream.

65. (Currently amended) The method according to claim 63 ~~wherein~~whereby the application of a ~~voltage~~electric potential across the third fluid stream causes movement of at least a portion of at least one of the selected compound and selected biological contaminants remaining in the first fluid stream ~~through~~thorough the second selective membrane into the third fluid stream.

66. (Currently amended) The method according to claim 63 ~~wherein the method further comprises~~comprising directing a fourth fluid stream separated from the second fluid stream by a third selective membrane, ~~wherein~~whereby ~~the~~ a preselected pore size of the third selective membrane allows selective migration of components in the second fluid stream through the third selective membrane into the fourth fluid stream.

67. (Currently amended) The method according to claim 66 ~~wherein~~whereby the third selective membrane has a preselected pore size so as to substantially prevent at least one of any biological contaminants removed to the second fluid stream and any other compounds in the second fluid stream from migrating through the third selective membrane into the fourth fluid stream and substantially retain the at least one of the selected biological contaminants and other components in the second fluid stream.

68. (Currently amended) The method according to claim 66 ~~wherein~~ whereby the application of a ~~voltage~~electric potential across the fourth fluid stream causes migration of at least a portion of at least one of any biological ~~contaminants~~contaminant removed to the second fluid stream, and any other compounds in the second fluid stream through the third selective membrane into fourth fluid stream.

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69. (Currently amended) The method according to claim 61 ~~wherein~~whereby the step of directing a third fluid stream directing the third fluid stream so as to be separated from the second fluid stream by the second selective membrane.

70. (Currently amended) The method according to claim 69 ~~wherein~~whereby the second selective membrane has a preselected pore size so as to substantially prevent at least one of any biological contaminants removed to the second fluid stream and any other compounds in the second fluid stream from migrating through the second selective membrane into the third fluid stream.

71. (Currently amended) The method according to claim 69 ~~wherein~~whereby the application of a ~~voltage~~electric potential across the third fluid stream causes migration of at least a portion of at least one of any biological contaminants removed to the second fluid stream, and any other compounds in the second fluid stream through the second selective membrane into the third fluid stream.

72. (Currently amended) The method according to claim 69 ~~wherein the method further comprises~~comprising directing a fourth fluid stream separated from the first fluid stream by a third selective membrane, ~~wherein~~whereby ~~the~~a preselected pore size of the third selective membrane allows selective migration of components in the first fluid stream through the third selective membrane into the fourth fluid stream.

73. (Currently amended) The method according to claim 72 ~~wherein~~whereby the third selective membrane has a preselected pore size so as to substantially prevent at least one of the selected compound and selected biological contaminants remaining in the first fluid stream from migrating through the third selective membrane into the fourth fluid stream and substantially retain at least one of the selected compound and selected biological contaminants in the first fluid stream.

74. (Currently Amended) The method according to claim 72 ~~wherein~~whereby the application of a ~~voltage~~electric potential across the fourth fluid stream causes movement of at least a

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portion of at least one of the selected compound and selected biological contaminants remaining in the first fluid stream through the third selective membrane into the fourth fluid stream.

75. (Currently amended) The method according to claim 61 ~~wherein the method further comprises~~comprising periodically stopping and reversing the ~~voltage~~electric potential to cause movement of at least any compounds of the first fluid stream having entered the first selective membrane to move back into the first fluid stream and ~~wherein~~whereby substantially not causing any of the selected compound and biological contaminants that have entered the second fluid stream to re-enter the first fluid stream.

76. (Currently amended) The method according to claim 61 ~~wherein~~whereby the first fluid stream further includes a compound from which the selected compound is separated, ~~wherein~~whereby such compound is selected from the group consisting of blood proteins, immunoglobulins, recombinant proteins, and combinations thereof.

77. (Currently amended) The method according to claim 61 ~~wherein~~whereby the biological contaminant is selected from the group consisting of viruses, bacteria, prions, yeast, lipopolysaccharides, toxins, endotoxins, and combinations thereof.

78. (Currently amended) The method according to claim 61 ~~wherein~~whereby the pH of the first fluid stream is selected by ~~selectively~~ adding a buffer having the required pH ~~and the pH is selected at one from the group consisting of~~ a pH lower than the isoelectric point of the compound, a pH about the isoelectric point of the compound, and a pH higher than the isoelectric point of the compound.

79. (Currently amended) A method for isolating at least a portion of a selected compound from a fluid stream, the method comprising:

- (a) directing a first fluid stream having a selected pH and including at least a selected compound so as to flow along a first selective membrane;
- (b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

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(c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane;

(d) applying at least one ~~voltageelectric~~ potential across at least the first and second fluid streams, ~~whereinwhereby~~ the application of such at least one ~~voltageelectric~~ potential causes movement of at least a portion of the selected compound ~~throughthrough~~ the first selective membrane into the second fluid stream, ~~whereinwhereby~~ the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream, and substantially all transmembrane migration of the selected compound is initiated by application of the electric potential; and

(e) maintaining step (d) until at least one of the fluid streams contains a desired purity of the selected compound.

80. (Currently amended) The method according to claim 79 ~~whereinwhereby~~ the first selective membrane has a preselected pore size so as to allow selective migration of components in the first fluid stream through the first selective membrane into the second fluid stream and selectively retain other components in the first fluid stream.

81. (Currently amended) The method according to claim 79 ~~wherein the method further comprisescomprising~~ directing a fourth fluid stream separated from the other of the first and second fluid streams by a third selective membrane, ~~whereinwhereby thea~~ preselected pore size of the third selective membrane allows selective migration of components in the other of first and second fluid streams through the third selective membrane into the fourth fluid stream.

82. (Currently amended) A method for isolating at least a portion of a selected compound from a fluid stream, the method comprising:

(a) directing a first fluid stream having a selected pH and including at least a selected compound so as to flow along a first selective membrane;

(b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

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(c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane;

(d) applying at least one ~~voltage~~electric potential across at least the first and second fluid streams, ~~wherein~~whereby the application of such at least one ~~voltage~~electric potential causes movement of at least a portion of components in the first fluid stream through the first selective membrane into the second fluid stream while the selected compound is prevented from entering the second fluid stream, ~~wherein~~whereby the second selective membrane has a preselected pore size that allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream, and substantially all transmembrane migration of the selected compound is initiated by application of the electric potential; and

(e) maintaining step (d) until at least one of the fluid streams contains a desired purity of the selected compound.

83. (Currently amended) The method according to claim 82 ~~wherein~~whereby the first selective membrane has a preselected pore size so as to allow selective migration of components in the first fluid stream through the first selective membrane into the second fluid stream and selectively retain other components in the first fluid stream.

84. (Currently amended) The method according to claim 82 ~~wherein the method further comprises~~comprising directing a fourth fluid stream separated from the other of the first and second fluid streams by a third selective membrane, ~~wherein~~whereby the preselected pore size of the third selective membrane allows selective migration of components in the other of first and second fluid streams through the third selective membrane into the fourth fluid stream.

85. (Currently amended) A system for ~~concurrently~~isolating at least a portion of both a selected compound and biological ~~contaminants~~contaminant from a fluid stream, the system comprising:

means for directing a first fluid stream having a selected pH and including at least one biological contaminant and a selected compound so as to flow along a first selective membrane;

means for directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

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means for directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane; and

means for applying at least one ~~voltage~~electric potential across at least the first and second fluid streams, ~~wherein~~whereby the application of such at least one ~~voltage~~electric potential causes movement of at least a portion of at least one of a selected compound and the biological ~~contaminants~~contaminant ~~though~~through the first selective membrane into the second fluid stream, ~~wherein~~whereby ~~the~~a preselected pore size of the second selective membrane allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream, and substantially all transmembrane migration of the selected compound is initiated by application of the electric potential.

86. (Currently amended) A system for ~~concurrently~~ isolating at least a portion of both a selected compound and biological ~~contaminants~~contaminant from a fluid stream, the system comprising:

means for directing a first fluid stream having a selected pH and including at least one biological contaminant and a selected compound so as to flow along a first selective membrane;

means for directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

means for directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane; and

means for applying at least one ~~voltage~~electric potential across at least the first and second fluid streams, ~~wherein~~whereby the application of such at least one voltage potential causes movement of at least a portion of the biological ~~contaminants~~contaminant ~~though~~through the first selective membrane into the second fluid stream while the selected compound is prevented from entering the second fluid stream, ~~wherein~~whereby ~~the~~a preselected pore size of the second selective membrane allows selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream, and substantially all transmembrane migration of the selected compound is initiated by application of the electric potential.

87. (new) The method according to claim 43 whereby the first stream is adjacent to the second stream and the third stream is adjacent to the second stream.

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88. (new) The method according to claim 43 whereby the first stream is adjacent to the second stream and adjacent to the second stream.

89. (new) The method according to claim 43 further comprising a fourth stream separated from an adjacent stream by a third selective membrane.

90. (new) A method for isolating at least a portion of both a selected compound and a biological contaminant from a fluid stream, the method comprising:

(a) directing a first fluid stream so as to flow along a first selective membrane;
(b) directing a second fluid stream along the first selective membrane so as to be isolated from the first fluid stream thereby;

(c) directing a third fluid stream separated from one of the first and second fluid streams by a second selective membrane, the second selective membrane having a preselected pore size allowing selective migration of components in at least one of the first and second fluid streams through the second selective membrane into the third fluid stream, and substantially all transmembrane migration of the selected compound is initiated by application of the electric potential;

(d) providing at least one biological contaminant and a selected compound in a selected pH to at least one stream so as to flow along a selective membrane

(e) applying at least one electric potential across the fluid streams, whereby at least a portion of at least one of the selected compound and the biological contaminant moves through a selective membrane into another fluid stream, and

(f) maintaining step (e) until at least one of the fluid streams contains a desired purity of the selected compound and another stream contains the biological contaminant.

91. (new) The method according to claim 90 further comprising directing a fourth stream separated from at least one of the first, second or third streams by a third selective membrane.